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THE COMPARATIVE SIZE OF BLOOD CORPUSCLES OF MAN AND DOMESTIC ANIMALS.

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Ever since the Hayden murder trial (October, 1879), in Connecticut, the subject of the comparative size of the blood corpuscles of man and animals has awakened greater interest in the minds of microscopists and medico-legal experts than it had before, and by many it has been made a special work.

The point of difference about which discussion centers itself is, that some investigators attribute to the microscope the power to distinguish between the blood corpuscles of human beings and those of other animals, especially of the dog. There are others who take the opposite ground, and say that no such distinction can be made.

That the investigation is of great importance, must, I think, be admitted by all; as yet, however, no definite results have been obtained. Thus far each one has had to rely on his personal experience and investigation into the subject.

With a view to ascertain whether there is, or is not an essential difference as to size and outline between the blood corpuscles of man and some of our domesticated animals, I determined to investigate the subject for myself.

In order that my measurements could in no way be influenced by the results obtained by others, the reports published from time to time were not studied until all my measurements were completed.

Of the ten specimens of blood examined, all were taken from live animals, with the exception of that of the new-born rabbit, which had been dead but a few hours. The cat was under the influence of chloroform when the drop of blood was taken, and the blood of the new-born child was taken from the umbilical cord, and was obtained through the kindness of a physician.

All the slides were prepared under the same circumstances and in exactly the same way, viz: by putting a small drop of blood on a perfectly clean slide, near the edge, then passing this slide, drop downwards, gently over another perfectly clean slide, and thus spreading the drop of blood over the surface of the latter in a uniformly thin layer. When this was dry a ring of shellac was run on the slide, and then a perfectly clean cover glass, 90μ in thickness, was carefully placed on the ring, and when this was dry, a ring of shellac was run around the cover.

The instruments used in the examination of the blood are Bulloch's professional stand with mechanical stage; Tolles' $\frac{1}{15}$ homogeneous immersion objective, corrected at 1; numerical aperture, 1.30; Bulloch's No. 9 eye-piece, with cobweb micrometer; W. A. Rogers' stage micrometer, divided in 1-100 millimeters (10 mm. or 1001 lines), and in 1-2500 inches (2-5 inches, or 1001 lines); an Abbé condenser made by Bulloch, and used with a small diaphragm; a common coal oil lamp.

In all the measurements the objective was corrected at 1; cedar oil was used as immersion fluid, and the same length of tube, 238 mm., as also the same *optical* tube length was maintained.

It is true that with the high amplification I used — 1,700 diameters — no objective, however good, brings out the outline of the corpuscles as sharp as a mathematical line. Jugdment must be used as to how much of this so-called shadow surrounding the corpuscles shall be included in the measurement of the corpuscle, and how much shall be regarded as shadow. Then, again, the cobwebs of the micrometer have a certain thickness. This is, however, a much more accurate means of determining the actual size of a corpuscle than by using the glass micrometer, and then guessing at the exact size, where it cannot be measured.

On each side, the corpuscles, which were approximately in the centre of the field, as the slide was moved from right to left, were measured. Those that were higher or lower than about one-fourth the diameter of the field were not measured, because the focus of the outline of these corpuscles above or below a certain distance from the center is never fully as sharp as of those in the centre, and in bringing them to the stationary cobweb, and in a position where they can best be seen, the slide must needs be moved up and down, as well as sideways. In doing this, confusion would arise as to which had been, and which had not been measured. Of the corpuscles in the centre of the field, only those were measured which appeared to be approximatively round; those showing a marked irregularity in shape were skipped.

One hundred corpuscles on each slide were measured, the measurements taken in divisions of the eye-piece micrometer. Each measurement, as soon as read off, was recorded in the tables accompanying this paper.

Only the average size of the whole 100, and that of the largest and smallest corpuscles, were reduced from these divisions to mikra. 21.16 of these divisions, with the optical apparatus employed, are equal to one mikron. This is the result of many measurements of Rogers' stage micrometer.

The measurements were not reduced to inches, because the mikron is accepted by the American Society of Microscopists as the *standard* microscopical *unit*, and as such it is also recognized all over Europe.

The photographs were taken so as to include as many as possible of the corpuscles that were measured. These can be measured on the negative, and by this means the first results can be verified.

In making the photographs, I used a Blair camera, Bulloch's professional stand, Tolles' $\frac{1}{15}$ homogeneous immersion objective, corrected at 1; Beck's No. 1 eye-piece

(approximately a 2-inch eye-piece); an Abbé condenser, made by Bulloch, used with a small diaphragm; a large Bull's eye-condenser, made by Bausch & Lomb; a coal oil lamp with a flat No. 3 burner; Seed's 5x7 dry plates, sensitometer 21. Time of exposure, 8 minutes. Exactly the same length of tube, and the same length of camera was used for all the photographs, and as Rogers' stage micromeeter was also photographed with precisely the same appliances, the exact amplification, which is 1040 diameters, could be easily measured on the negative.

After carefully examining the specimens of blood, I feel that I can assert without fear of contradiction, that there can be no question but that the blood of human beings can readily be distinguished from that of such animals as the mule, cat, calf, and horse, and more readily from cattle, sheep, and pigs. As there is so marked a difference, I have thought it necessary to examine only the blood of the first three, and to record the results obtained.

The blood corpuscles of these animals are not only on the average much smaller, but the largest corpuscles measured are smaller than those of an average size of the human blood. This can easily be seen by referring to the tables of measurements, and also to the photographs.

Between the blood of the rabbit, dog, and man, finer discrimination must be made. Although the average size of the blood corpuscles of the two former is smaller than that of man, the difference is not very great. It may be, however, that by further investigation, by examining other specimens of the blood of these animals, this difference may be found to be a permanent one, and again we may find it greatly diminished. A much more thorough and extensive examination than I have been able to make here, must be made before a difference can, or ought to, be established with certainty.

It is a much simpler matter to distinguish between the blood corpuscles of a very young and full-grown animal of the same species than it is to distinguish between those of the full-grown rabbit, dog, and man. The blood corpuscles of very young animals lack symmetry of outline and show a marked inequality of contour. Only the minority of the corpuscles are approximately round, and these round ones are chiefly those which are more or less isolated on the slide.

A noticeable feature in this connection, discovered in these examinations, is that almost invariably the largest corpuscles are found where the corpuscles are scattered; and in a field where they are numerous and close together the general average also is smaller.

The greater size of the blood corpuscles of young animals, their want of symmetry in outline and want of roundness can all be explained, if we assume that they are less dense, and hence softer than those of older animals. And it seems that the manner in which the slides were made, brought to bear a greater pressure on these softer corpuscles than they could resist, and hence they became spread out and show distortions which are rarely found in the blood corpuscles of older animals, which we must assume have become more dense and compact as the animal grew older.

In the specimens examined of the blood of the old dog and of the full-grown person, there is certainly a difference in size as to the average, and also as to the largest and smallest corpuscles. So, if in, suppose, a criminal case, it should be claimed that a certain specimen of blood is that of an old dog, it might be determined without much diffculty whether it was human or dogs' blood. But suppose it was claimed to be blood of a young dog, one still entitled to be called a pup, then it would be almost impossible to determine which it was, if one expected to decide the question by the difference in size only.

For although there is a very marked difference in the sizes of the corpuscles of a young and an old dog, the size of the corpuscles of a young dog correspond pretty closely with those of a grown person.

Thus, as to size, we might be at a loss to say which it was, but a decision might be arrived at through further investigation, as by employing other means than those of measurement only; here the difference in contour and apparent density would be an important point.

The largest corpuscle, $12+\mu$, found in the specimen of child's blood, is very much larger than any yet found, but the average of the 100 corpuscles measured is smaller (to however so slight an amount that it may be due to some mistake in the measurements) than the average of the young dogs' blood. I would, therefore, pronounce it impossible, on the strength of the measurement made, to distinguish between the young child's and the puppy's blood.

But even with all the data here furnished, to look at the matter carefully from all sides, it would indeed be rash, and in many cases criminal, to arrive at a final conclusion. The investigator must be expert, exact, and must have had experience in this work, and not only that, but he must be conscientious, as well. It will not do to take for granted that the average size of the entire quantity of blood corpuscles in any one animal, and much less the average size of the whole quantity in all the animals of one species, corresponds exactly to the average size of the one hundred corpuscles taken from a single drop of blood.

Of course it is utterly impossible to measure every corpuscle in the blood of an animal, but a thousand or more should at least be measured before the mere hypothesis, that there is a well defined difference between the blood corpuscles of human beings and those of some of our domesticated animals, can be established as a fact.

HUMAN BLOOD.—No. 1.

No. of corpuscle.	Spaces. 21.16 sp.=1μ.	No. of corpuscle.	Spaces. 21.16 sp.=1μ.	No. of corpuscle.	Spaces. 21.19 sp.=1μ.	No. of corpuscle.	Spaces. 21.16 sp.=1μ.
1	171	26	185½	51	199	76	172
2	167	27	177	52	177	77	177
3	188	28	194	53	172	78	146
4	177	29	180	54	179	79	179
5	179	30	176	55	175	80	168
6	174	31	182	56	170	81	175
7	184	32	156	57	162	82	180
8	152	33	154	58	176	83	172
9	193	34	175	59	173	84	185
10	175	35	188	60	171	85	180
11	**201**	36	177	61	173	86	184
12	179	37	164	62	183	87	169
13	174	38	195	63	170	88	178
14	177	39	180	64	163	89	176
15	174	40	178	65	182	90	170
16	189	41	171	66	169	91	181
17	175	42	167	67	177	92	160
18	170	43	176	68	167	93	176
19	178	44	172	69	191	94	190
20	181	45	155	70	179	95	173
21	186	46	164	71	**141**	96	166
22	186	47	161	72	168	97	194
23	177	48	190	73	155	98	182
24	167	49	171	74	200	99	162
25	184	50	174	75	163	100	189

The largest corpuscle measures 201 spaces $= 9^{\underline{499}}\mu$.

The smallest corpuscle measures 141 spaces $= 6^{\underline{6635}}\mu$.

The average of 100 corpuscles 175^{395} spaces $= 8^{\underline{289}}\mu$.

HUMAN BLOOD.—No. 2.

No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle,	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.
1	171	26	175	51	168	76	185
2	169	27	164	52	164	77	172
3	182	28	168	53	163	78	149
4	167	29	161	54	172	79	170
5	156	30	169	55	191	80	176
6	174	31	165	56	164	81	163
7	162	32	162	57	182	82	171
8	189	33	167	58	175	83	181
9	177	34	166	59	186	84	173
10	163	35	182	60	172	85	164
11	174	36	168	61	163	86	154
12	180	37	162	62	180	87	159
13	169	38	172	63	160	88	173
14	154	39	192	64	176	89	182
15	175	40	153	65	163	90	171
16	165	41	160	66	178	91	**146**
17	170	42	165	67	179	92	166
18	162	43	172	68	165	93	164
19	158	44	166	69	150	94	169
20	181	45	163	70	157	95	157
21	**194**	46	175	71	168	96	172
22	179	47	164	72	177	97	165
23	166	48	174	73	166	98	174
24	163	49	149	74	161	99	192
25	168	50	175	75	168	100	170

The largest corpuscle measures 194 spaces = $9^{\underline{1682}}\mu$.
The smallest corpuscle measures 146 spaces = $6^{\underline{8998}}\mu$.
The average of 100 corpuscles $169^{\underline{13}}$ spaces = $7^{\underline{9929}}\mu$.

BLOOD OF NEW-BORN WHITE RABBIT.

No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.
1	175	26	167	51	181	76	179
2	164	27	170	52	189	77	171
3	171	28	171	53	171	78	186
4	159	29	185	54	200	79	189
5	167	30	193	55	185	80	163
6	178	31	191	56	128	81	165
7	164	32	174	57	191	82	168
8	161	33	141	58	189	83	158
9	175	34	185	59	115	84	186
10	171	35	188	60	175	85	191
11	194	36	192	61	191	86	176
12	197	37	174	62	186	87	159
13	184	38	189	63	196	88	182
14	173	39	170	64	198	89	189
15	181	40	173	65	170	90	185
16	202	41	178	66	165	91	153
17	**89**	42	177	67	192	92	189
18	167	43	156	68	179	93	186
19	146	44	180	69	189	94	168
20	211	45	185	70	186	95	175
21	184	46	167	71	173	96	166
22	178	47	181	72	201	97	181
23	117	48	170	73	175	98	182
24	177	49	168	74	160	99	176
25	**214**	50	138	75	196	100	174

The largest corpuscle measures 214 spaces = $10^{\underline{1134}}\mu$.

The smallest corpuscle measures 89 spaces = $4^{\underline{206}}\mu$.

The average of 100 corpuscles $176^{\underline{4}}$ spaces = $8^{\underline{336}}\mu$.

BLOOD OF AN AGED RABBIT.

No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.
1	162	26	166	51	158	76	154
2	148	27	154	52	157	77	171
3	167	28	152	53	154	78	158
4	162	29	156	54	161	79	160
5	169	30	148	55	154	80	161
6	**178**	31	155	56	150	81	153
7	152	32	171	57	160	82	146
8	174	33	153	58	157	83	154
9	155	34	154	59	161	84	145
10	143	35	160	60	154	85	161
11	157	36	143	61	160	86	153
12	172	37	161	62	157	87	158
13	170	38	165	63	145	88	146
14	144	39	158	64	156	89	154
15	147	40	167	65	170	90	**112**
16	164	41	154	66	162	91	138
17	161	42	152	67	172	92	154
18	154	43	155	68	159	93	170
19	163	44	152	69	148	94	153
20	159	45	163	70	158	95	164
21	142	46	156	71	159	96	161
22	168	47	159	72	165	97	158
23	157	48	150	73	168	98	165
24	152	49	147	74	154	99	155
25	160	50	152	75	157	100	152

The largest corpuscle measures 178 spaces = $8^{\underline{41209}}\mu$.
The smallest corpuscle measures 112 spaces = $5^{\underline{293}}\mu$.
The average of 100 corpuscles $156^{\underline{93}}$ spaces = $7^{\underline{4163}}\mu$.

BLOOD OF DOG.

No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.
1	**196**	26	175	51	155	76	180
2	169	27	164	52	148	77	164
3	159	38	183	53	168	78	155
4	157	29	162	54	167	79	165
5	164	30	168	55	153	80	178
6	175	31	163	56	160	81	167
7	163	32	173	57	184	82	153
8	155	33	186	58	160	83	143
9	158	34	170	59	163	84	**138**
10	171	35	169	60	169	85	156
11	143	36	139	61	153	86	153
12	150	37	160	62	150	87	165
13	142	38	152	63	155	88	161
14	171	39	161	64	161	89	163
15	164	40	167	65	159	90	165
16	166	41	141	66	164	91	171
17	155	42	175	67	158	92	158
18	165	43	156	68	186	93	174
19	167	44	150	69	163	94	170
20	174	45	185	70	166	95	165
21	157	46	161	71	175	96	164
22	162	47	167	72	170	97	167
23	151	48	152	73	163	98	159
24	176	49	155	74	152	99	154
25	163	50	138	75	166	100	164

The largest corpuscle measures 196 spaces = $9^{\underline{2627}}\mu$.

The smallest corpuscle measures 138 spaces = $6^{\underline{5217}}\mu$.

The average of 100 corpuscles $162^{\underline{65}}$ spaces = $7^{\underline{6724}}\mu$.

BLOOD OF PUPPY FIVE DAYS OLD.

No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.
1	205	26	193	51	174	76	182
2	209	27	214	52	210	77	198
3	197	28	186	53	193	78	202
4	178	29	182	54	194	79	179
5	186	30	**220**	55	199	80	195
6	196	31	199	56	167	81	184
7	207	32	194	57	196	82	190
8	188	33	195	58	212	83	175
9	196	34	190	59	202	84	**160**
10	191	35	204	60	183	85	191
11	189	36	179	61	176	86	186
12	217	37	191	62	188	87	183
13	195	38	205	63	193	88	195
14	182	39	187	64	180	89	176
15	170	40	197	65	185	90	217
16	210	41	188	66	200	91	188
17	177	42	172	67	208	92	184
18	179	43	191	68	183	93	169
19	207	44	188	69	199	94	178
20	209	45	167	70	191	65	181
21	184	46	181	71	193	96	213
22	181	47	171	72	189	97	209
23	174	48	176	73	177	98	197
24	202	49	210	74	179	99	203
25	182	50	205	75	196	100	196

The largest corpuscle measures 220 spaces = $10^{\underline{397}}\mu$.

The smallest corpuscle measures 160 spaces = $7^{\underline{5614}}\mu$.

The average of 100 corpuscles 191^{04} spaces = $9^{\underline{0283}}\mu$.

BLOOD OF MULE.

No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21·16 sp. = 1μ.	No. of corpuscle.	Spaces 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.
1	128	26	122	51	140	76	123
2	115	27	138	52	131	77	146
3	137	28	129	53	149	78	136
4	122	29	125	54	113	79	120
5	132	30	127	55	131	80	145
6	121	31	126	56	118	81	112
7	118	32	128	57	124	82	145
8	131	33	145	58	135	83	125
9	118	34	**97**	59	131	84	111
10	145	35	120	60	128	85	134
11	110	36	132	61	120	86	139
12	123	37	128	62	112	87	119
13	127	38	119	63	136	88	121
14	130	39	140	64	123	89	123
15	135	40	137	65	130	90	136
16	129	41	121	66	144	91	135
17	120	42	127	67	113	92	116
18	130	43	143	68	112	93	134
19	134	44	158	69	115	94	133
20	123	45	132	70	125	95	132
21	115	46	127	71	116	96	124
22	125	47	130	72	132	97	135
23	111	48	120	73	134	98	138
24	148	49	131	74	126	99	132
25	124	50	135	75	115	100	**165**

The largest corpuscle measures 165 spaces = $7^{\underline{7977}}\mu$.

The smallest corpuscle measures 97 spaces = $4^{\underline{5841}}\mu$.

The average of 100 corpuscles $128^{\underline{3}}$ spaces = $6^{\underline{0633}}\mu$.

BLOOD OF CALF THREE DAYS OLD.

No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.
1	121	26	137	51	125	76	137
2	133	27	134	52	117	77	123
3	123	28	128	53	138	78	117
4	140	29	125	54	125	79	123
5	130	30	122	55	122	80	128
6	132	31	125	56	131	81	125
7	125	32	117	57	127	82	101
8	110	33	133	58	115	83	123
9	121	34	120	59	127	84	121
10	123	35	116	60	139	85	126
11	137	36	121	61	114	86	117
12	116	37	126	62	129	87	126
13	115	38	114	63	124	88	127
14	119	39	131	64	123	89	119
15	131	40	115	65	137	90	102
16	122	41	133	66	142	91	**143**
17	100	42	132	67	129	92	116
18	140	43	139	68	117	93	122
19	116	44	136	69	**90**	94	138
20	126	45	119	70	124	95	125
21	119	46	120	71	132	96	113
22	118	47	125	72	128	97	128
23	120	48	132	73	123	98	110
24	131	49	121	74	130	99	123
25	127	50	133	75	119	100	119

The largest corpuscle measures 143 spaces = $6^{\underline{758}}\mu$.
The smallest corpuscle measures 90 spaces = $4^{\underline{253}}\mu$.
The average of 100 corpuscles $124^{\underline{3}}$ spaces = $5^{\underline{874}}\mu$.

BLOOD OF AN AGED CAT (MALE).

No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.
1	130	26	114	51	117	76	138
2	134	27	132	52	114	77	123
3	123	28	116	53	125	78	144
4	130	29	149	54	128	79	132
5	128	30	119	55	122	80	126
6	115	31	114	56	120	81	117
7	108	32	115	57	118	82	119
8	133	33	119	58	135	83	135
9	141	34	136	59	120	84	124
10	128	35	113	60	141	85	114
11	124	36	134	61	143	86	123
12	122	37	122	62	**150**	87	129
13	129	38	136	63	132	88	125
14	110	39	111	64	123	89	126
15	131	40	132	65	119	90	140
16	125	41	130	66	121	91	138
17	118	42	141	67	127	92	117
18	146	43	116	68	122	93	137
19	125	44	126	69	116	94	132
20	143	45	136	70	129	95	**103**
21	124	46	123	71	147	96	144
22	113	47	114	72	125	97	126
23	144	48	121	73	125	98	139
24	127	49	135	74	128	99	122
25	147	50	132	75	108	100	124

The largest corpuscle measured 150 spaces = $7^{\underline{0888}}\mu$.
The smallest corpuscle measures 103 spaces = $4^{\underline{8676}}\mu$.
The average of 100 corpuscles $126^{\underline{85}}$ spaces = $5^{\underline{9948}}\mu$.

BLOOD OF NEW-BORN CHILD.

No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.	No. of corpuscle.	Spaces. 21.16 sp. = 1μ.
1	**260**	26	196	51	199	76	185
2	181	27	223	52	186	77	166
3	194	28	186	53	191	78	194
4	186	29	171	54	217	79	213
5	198	30	180	55	149	80	187
6	205	31	224	56	174	81	177
7	209	32	183	57	194	82	175
8	188	33	207	58	208	83	159
9	185	34	219	59	209	84	184
10	175	35	177	60	185	85	212
11	176	36	212	61	190	86	211
12	200	37	184	62	195	87	190
13	191	38	193	63	193	88	162
14	182	39	178	64	176	89	196
15	215	40	248	65	191	90	210
16	187	41	225	66	178	91	196
17	207	42	189	67	181	92	205
18	189	43	198	68	159	93	187
19	160	44	182	69	167	94	188
20	208	45	218	70	215	95	192
21	213	46	196	71	169	96	181
22	**140**	47	224	72	201	97	162
23	183	48	163	73	173	98	195
24	201	49	167	74	196	99	191
25	205	50	160	75	158	100	180

The largest corpuscle measures	260	spaces $= 12^{\underline{2873}}\mu$.
The smallest corpuscle measures	140	spaces $= 6^{\underline{6162}}\mu$.
The average of 100 corpuscles	$191^{\underline{03}}$	spaces $= 9^{\underline{028}}\mu$.

EXPLANATION OF THE PLATE.

I.— Blood of aged persons (54 years), showing one of the largest blood corpuscles measured on this slide.

II.— Blood of same person — showing average size of corpuscles.

III.— Blood of full-grown young person — showing average size of corpuscles.

IV.— Blood of new-born white rabbit.

V.— Blood of aged female rabbit, mother of the new-born rabbit, of which sample represented by Plate IV was taken.

VI.— Blood of middle-aged full-grown dog — common street dog, medium size.

VII.— Blood of puppy, five days old.

VIII.— Blood of mule — showing near the centre the largest corpuscle found on the slide.

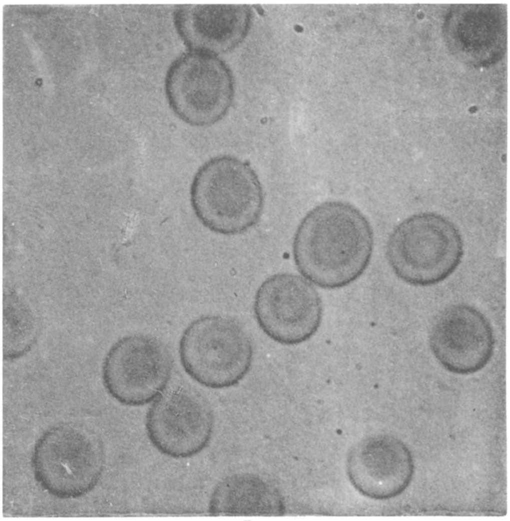
IX.— Blood of Jersey calf, three days old.

X.— Blood of aged cat.

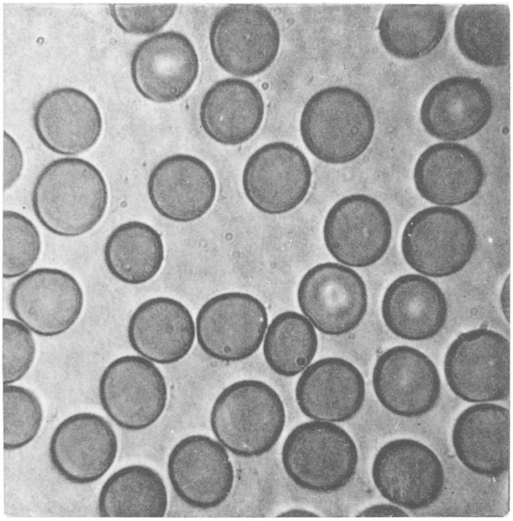
XI.— Blood of new-born child — showing the largest corpuscle found on the slide. The sample of blood was taken from the umblical cord.

XII.— Blood of same child, also from the umblical cord, showing a field of nearly round corpuscles of about average size.

NOTE.— The illustrations herewith presented are process reproductions from the original photographic negatives, hence must exactly correspond with the photo-prints. —[ED.



I.



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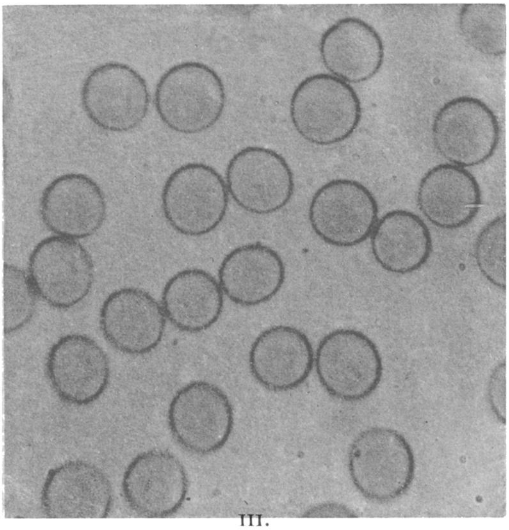

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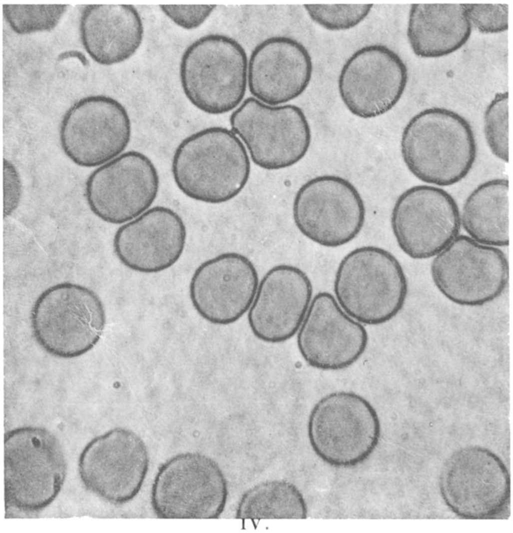

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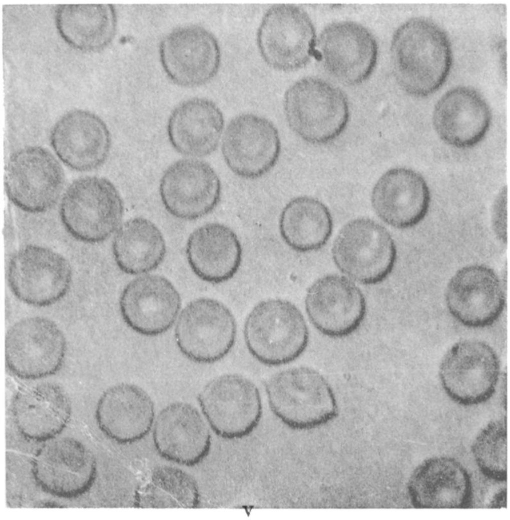

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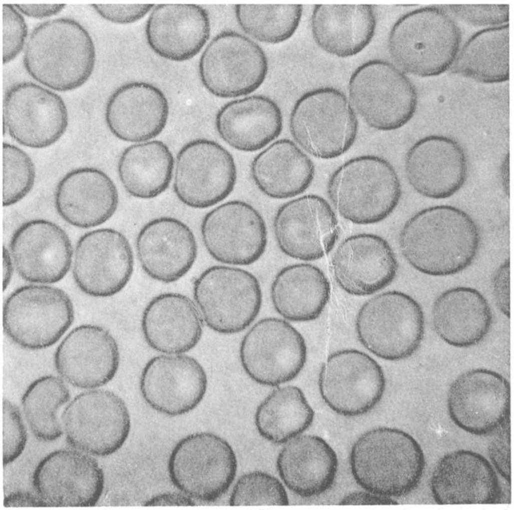

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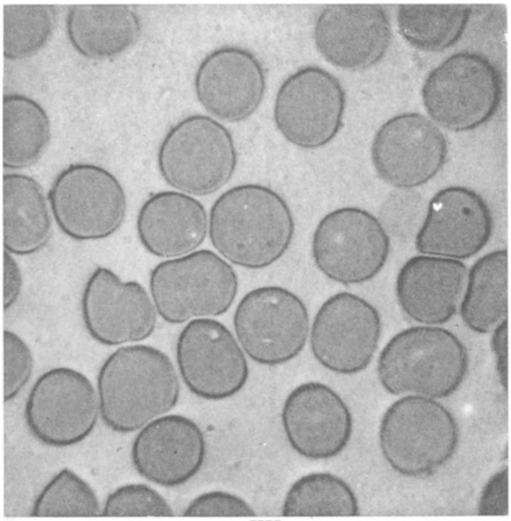

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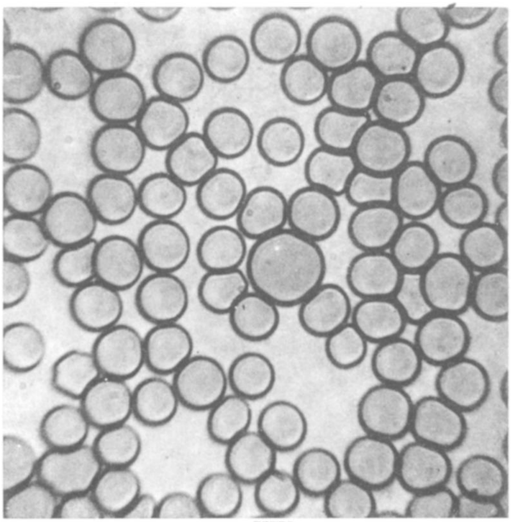

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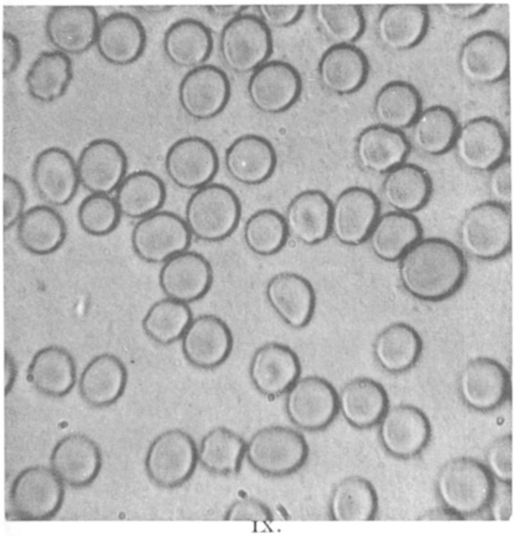

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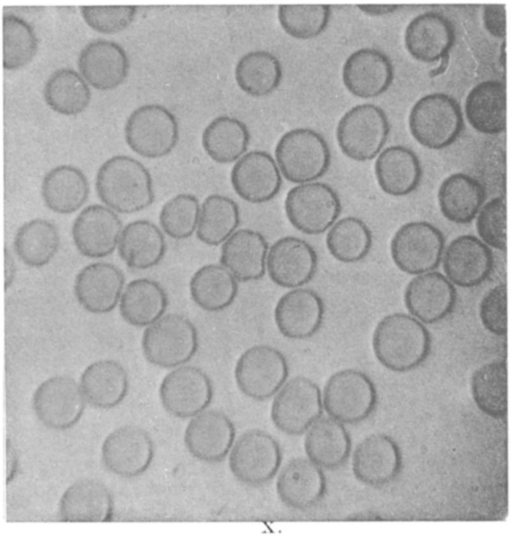
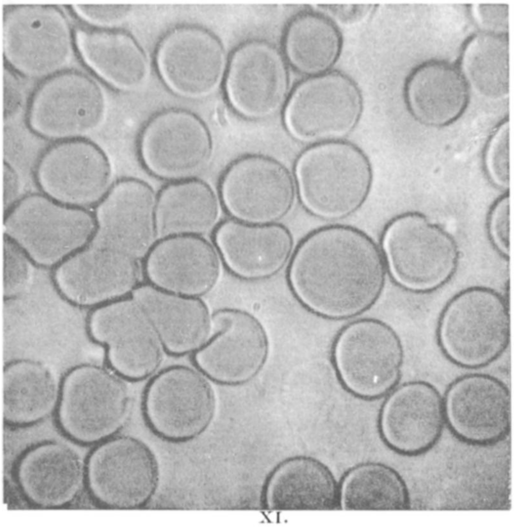


X.



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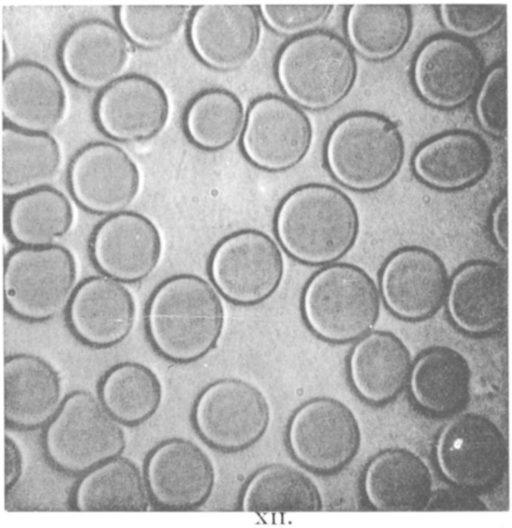

XII.

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